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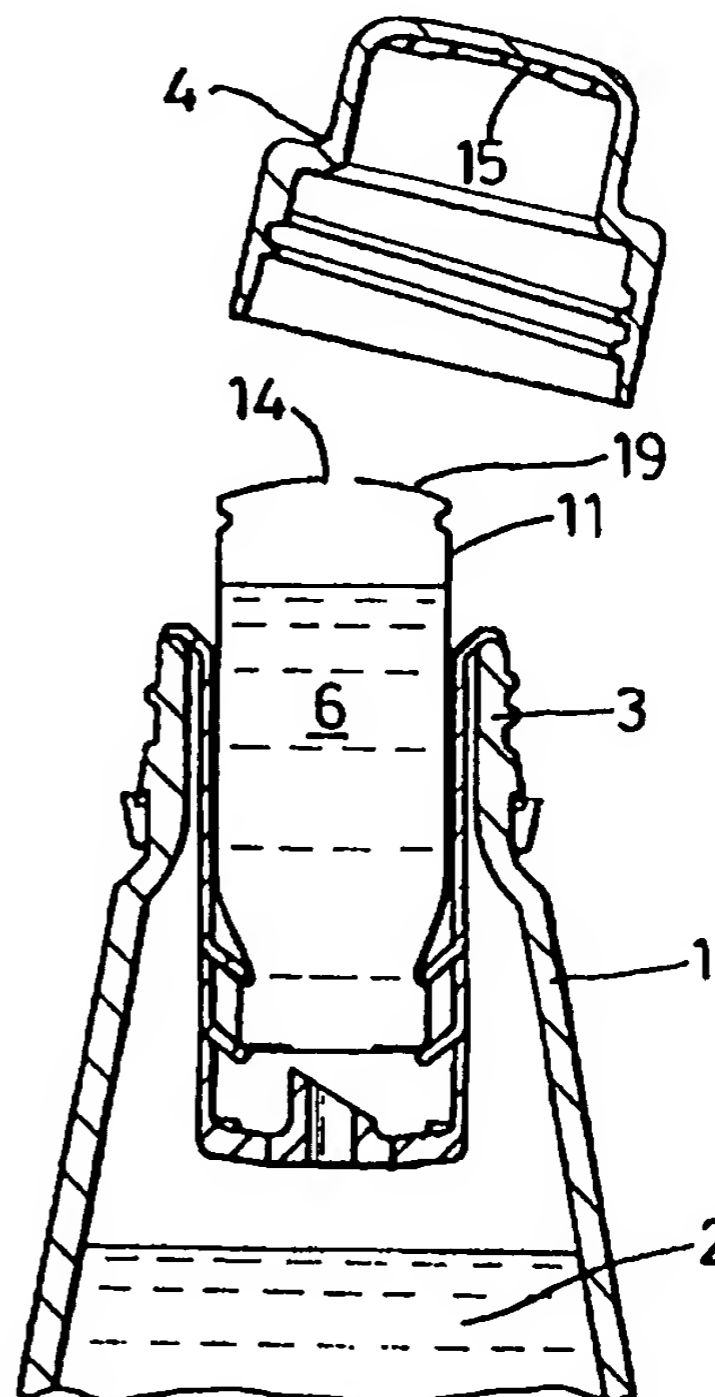
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB96/03092</p> <p>(22) International Filing Date: 13 December 1996 (13.12.96)</p> <p>(30) Priority Data: 9525414.0 13 December 1995 (13.12.95) GB</p> <p>(71) Applicant (for all designated States except US): ROCEP LUSOL HOLDINGS LIMITED [GB/GB]; Rocep Business Park, Kings Inch Road, Deanpark, Renfrew PA4 8XY (GB).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): FRUTIN, Bernard, Derek [GB/GB]; Jaapston, By Uplawmoor, Renfrewshire GT8 3B6 (GB).</p> <p>(74) Agent: McCALLUM, Graeme, David; Murgitroyd &amp; Company, 373 Scotland Street, Glasgow G5 8QA (GB).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>

(54) Title: A DEVICE FOR RELEASING A FLUID INTO A LIQUID IN A CONTAINER

## (57) Abstract

A device (5) for releasing a fluid (6) into a liquid (2) in a container (1) includes a housing (7). At least a portion of the housing (7) is adapted to be inserted into an opening (3) in the container (1). The portion of the housing (7) has a fluid outlet (17). A puncturing device (18) is mounted on the housing (7) and a fluid chamber (11) is movably mounted on the housing (7) for movement between a storage position, in which fluid (6) is retained within the fluid chamber (11), and a release position in which the fluid chamber (11) is punctured by the puncturing device (18) and the fluid (6) is released from the fluid chamber (11) to exit from the device through the fluid outlet (17).



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1     "A Device for Releasing a Fluid into a Liquid in a  
2     Container"

3

4     The invention relates to a device for releasing a fluid  
5     into a first liquid in a container.

6

7     In a number of applications, such as mixtures of  
8     different liquids, it may be necessary to release and  
9     mix a liquid into another liquid shortly before the  
10    liquid mixture is used. It may not be possible or  
11    desirable to store the liquids in a premixed form, as  
12    they may react undesirably with each other when stored  
13    as the mixture for a period of time. An example of  
14    this may be mixtures of alcoholic drinks and non-  
15    alcoholic drinks. However, it can also apply to other  
16    liquids or to mixtures of liquids and gases.

17

18    In accordance with a first aspect of the present  
19    invention, a device for releasing a fluid into a liquid  
20    in a container comprises a housing, at least a portion  
21    of which is adapted to be inserted into an opening in  
22    the container and the portion having a fluid outlet  
23    therein; a puncturing device mounted on the housing; a  
24    fluid chamber movably mounted on the housing for  
25    movement between a storage position, in which fluid is

1 retained within the fluid chamber, and a release  
2 position, in which the fluid chamber is punctured by  
3 the puncturing device and fluid is released from the  
4 fluid chamber to exit from the device through the fluid  
5 outlet.

6  
7 In accordance with a second aspect of the present  
8 invention, a container of a liquid comprises an opening  
9 closed by a releasable closure and a device for  
10 releasing a fluid into the liquid in the container, the  
11 device being mounted in the container adjacent the  
12 opening, and the device being in accordance with the  
13 first aspect of the invention.

14  
15 An advantage of the invention is that by having a fluid  
16 chamber which releases fluid when it is punctured it is  
17 possible to delay puncturing the fluid chamber until  
18 the fluid is to be released into the liquid in the  
19 container, just before the liquid is to be used.

20  
21 The housing may include a conduit into which the fluid  
22 passes after passing through the fluid outlet and the  
23 conduit extends below the surface of the liquid in the  
24 container. Typically, the conduit extends to at least  
25 adjacent the mid-section of the first liquid in the  
26 first container and preferably, extends to adjacent the  
27 bottom of the first container.

28  
29 Alternatively, the fluid may be released onto the  
30 surface of the liquid in the container by the device.

31  
32 Typically, the fluid chamber may contain a liquid  
33 and/or a gas. Preferably, the fluid in the chamber is  
34 pressurised prior to puncturing of the chamber.  
35 Pressurisation of the fluid would aid expulsion of the  
36 fluid from the fluid chamber on release of the closure.

1 Preferably, the fluid chamber includes a rupturable  
2 member which is punctured by the puncturing device to  
3 release the fluid from the fluid chamber. Typically,  
4 the rupturable member may be a membrane.

5  
6 In a first example, the fluid chamber may be manually  
7 movable to the release position. In a second example,  
8 the device could be located inside the container and  
9 the fluid chamber moves to the release position on  
10 opening of the container.

11  
12 An advantage of the manually operable fluid chamber is  
13 that a user can choose whether to introduce the fluid  
14 into the liquid in the container, if addition of the  
15 fluid is optional to use of the liquid.

16  
17 In the second example, the housing may comprise two  
18 portions, a pressurisable portion and the portion  
19 having the fluid outlet, and a valve device may be  
20 fitted to permit the pressure within the pressurisable  
21 portion to equalise with the pressure within the  
22 container, the valve device substantially preventing  
23 release of pressure from the pressurisable portion when  
24 the releasable closure is removed to open the  
25 container.

26  
27 The advantage of this feature is that when the pressure  
28 within the container is greater than ambient pressure  
29 or atmospheric pressure when the container is closed,  
30 the pressurisable portion will equalise to the same  
31 pressure as the container. When the container is  
32 opened a pressure differential will be created between  
33 the container and the pressurisable portion because  
34 pressure is not released from the pressurisable  
35 portion, and the pressure differential can be used to  
36 move the fluid chamber to the release position. The

1 valve device may be a semi-permeable membrane which  
2 permits gas into the pressurisable portion of housing  
3 but is not sufficiently permeable to permit the gas to  
4 escape from the pressurisable portion when the  
5 container is opened and before the fluid chamber moves  
6 to the release position. Alternatively, the valve  
7 device may be a one-way valve.

8  
9 Preferably, the pressurisable portion may be sealed  
10 from the portion having the fluid outlet by the fluid  
11 chamber which co-operates with the housing to effect a  
12 seal between the fluid chamber and the housing. A  
13 sealing device may be located on one or both of the  
14 fluid chambers and the housing to help effect the seal.

15  
16 Preferably, the fluid and the liquid may be any  
17 combination. Examples of combinations are the fluid  
18 being lime juice and the liquid being lager, or the  
19 fluid being chocolate flavouring and gas and the liquid  
20 being milk. The first combination would give the user  
21 a lager and lime drink, the second combination would  
22 give a chocolate milk shake with the gas helping to  
23 generate the froth on the shake.

24  
25 Examples of a device for releasing a fluid into a  
26 liquid in a container in accordance with the invention.  
27 will now be described with reference to the  
28 accompanying drawings, in which:-

29  
30 Fig. 1 is a cross-sectional view through an upper  
31 portion of a container with a first example of a  
32 device for releasing a fluid into a liquid in the  
33 container with the device in a first position in  
34 the container;

35 Fig. 2 is a cross-sectional view through the  
36 container of Fig. 1 showing the device mounted in

1 the container and the closure of the container  
2 removed;  
3 Fig. 3 is a cross-sectional view of the container  
4 of Fig. 1 with the device in a release position;  
5 Fig. 4 is a cross-sectional view of the container  
6 of Fig. 1 with the device removed from the  
7 container;  
8 Fig. 5 is a cross-sectional view through a  
9 container showing a second example of a device for  
10 releasing fluid into a liquid in the container  
11 with the device in a first position;  
12 Fig. 6 is a cross-sectional view through the  
13 container of Fig. 5 with the closure removed;  
14 Fig. 7 is a cross-sectional view through the  
15 container of Fig. 5 with the device in a release  
16 position;  
17 Fig. 8 is a cross-sectional view through the  
18 container of Fig. 5 showing the device being  
19 removed from the container;  
20 Fig. 9 is a cross-sectional view through an upper  
21 portion of a container, showing a third example of  
22 a device for releasing fluid into liquid in the  
23 container with the device in a first position;  
24 Fig. 10 is a cross-sectional view of the container  
25 shown in Fig. 9, with the closure of the container  
26 removed and the device in a second position;  
27 Fig. 11 is a cross-sectional view of the container  
28 of Fig. 9, with the device in a release position;  
29 Fig. 12 is a cross-sectional view of the container  
30 of Fig. 9 showing the device being removed from  
31 the container;  
32 Fig. 13 is a cross-sectional view through an upper  
33 portion of a container showing a fourth example of  
34 a device for releasing fluid into liquid in the  
35 container;  
36 Fig. 14 is a cross-sectional view through an upper

1 portion of a container showing a fifth example of  
2 a device for releasing fluid into liquid in the  
3 container;

4 Fig. 15 is a cross-sectional view through an upper  
5 portion of a container showing a sixth example of  
6 a device for releasing fluid into liquid in the  
7 container;

8 Fig. 16 is a cross-sectional view through a  
9 seventh example of a device for releasing fluid  
10 into liquid in a container with a fluid chamber in  
11 a first position;

12 Fig. 17 is a cross-sectional view through the  
13 device of Fig. 16 showing the fluid chamber in an  
14 intermediate release position; and,

15 Fig. 18 is a cross-sectional view through the  
16 device of Figs. 16 and 17 showing the fluid  
17 chamber in a final release position.

18  
19 Fig. 1 shows an upper portion of a container 1 which  
20 has a liquid 2 within it. The container 1 also has a  
21 threaded opening 3 on which a closure 4 is located.  
22 Located within the threaded opening 3 is a device 5 for  
23 releasing a fluid 6 into the liquid 2 in the container  
24 1.

25  
26 The device 5 comprises an outer housing 7 which has  
27 spaced apart spurs 8, 9 between which a head 10 of a  
28 fluid chamber 11 is located. The head 10 has an  
29 opening 12 which is sealed by a foil cap 13. The  
30 opposite end of the fluid chamber 11 has a vent hole 14  
31 which is sealed in the position shown in Fig. 1 by a  
32 seal 15 located on the inside of the closure 4.

33  
34 The housing 7 has a lip section 16 which rests on the  
35 upper end of the threaded opening 3 and is held in  
36 position by the closure 4, as shown in Fig. 1. The

1 lower end of the housing 7 has a fluid outlet 17 which  
2 passes through the centre of a rupturing portion 18  
3 which points upwards towards the foil cap 13 covering  
4 the opening 12 of the fluid chamber 11.

5

6 The position shown in Fig. 1, is the position in which  
7 the device 5 would be located when the container 1 is  
8 retailed or stored.

9

10 When a user wishes to use the contents of the container  
11 1, the closure 4 is removed, as shown in Fig. 2, which  
12 also removes the seal 15 from the vent hole 14. A user  
13 then presses upper end 19 of the chamber 11 downwards,  
14 as indicated by arrow 20 in Fig. 3. This causes the  
15 head 10 to deflect the spurs 8 and spiked portion 18 of  
16 the housing 7 ruptures the foil cap 13. The fluid 6  
17 within the fluid chamber 11 exits the chamber and the  
18 housing 7 through the fluid outlet 17 in the spike 18  
19 thereby releasing the fluid 6 on to the surface of the  
20 liquid 2 in the container 1. The fluid 6 empties from  
21 the chamber 11 because air can enter the chamber 11  
22 simultaneously through the vent hole 4.

23

24 The combination of the liquid 2 and the liquid 6 forms  
25 a mixed liquid 21 in the container 1. The device 5 may  
26 then be removed from the opening 3 (see Fig. 4) by a  
27 user grasping nibs 22 on the upper end of the chamber  
28 11 to remove the device from the container 1. The  
29 housing 7 is removed from the container 1  
30 simultaneously with the chamber 11 because the chamber  
31 11 is locked to the housing 7 by spurs 8 which engage  
32 behind head 10 on the chamber 11.

33

34 A second example of a device for releasing fluid into a  
35 liquid 2 in a container 1, is shown in Figs. 5 to 8.  
36 The device 24 is similar to the device 5 shown in Figs.

1 1 to 4, except that the device 24 includes a chamber 23  
2 which does not have a vent hole 14 and has a sealing  
3 gasket 25 at opening 26, which is sealed by a foil  
4 membrane 27. In addition, the chamber 23 contains a  
5 liquid 28 and a pressurised gas 56.

6  
7 Also, the lower section of housing 7 is modified in  
8 that it has a rupturing portion 29 and a connector  
9 section 30 depending therefrom. The connector section  
10 30 is connected to a dip tube 31. A fluid outlet 32  
11 extends through the rupturing portion 29 and  
12 communicates with the inside of the dip tube 31.

13  
14 In use, the position of the device 24, as shown in Fig.  
15 5 is the position in which the container 1 would be  
16 retailed or stored.

17  
18 When a user wishes to use the contents of the container  
19 1, the closure 4 is removed (see Fig. 6) and end 24 of  
20 the container 23 is pushed downwards to move the  
21 chamber 23 towards the rupturing portion 29 causing the  
22 rupture portion 29 to rupture the foil closure 27 (see  
23 Fig. 7). When this occurs, the liquid 28 is expelled  
24 from the chamber 23, by the pressure of the gas 56,  
25 through the outlet 32 and into the liquid 2 in the  
26 container 1, via the dip tube 31. The liquid 28 mixes  
27 with the liquid 2 to form a mixed liquid 59 in the  
28 container 1.

29  
30 The device 24 may then be removed from the container 1,  
31 as with device 5, by grasping nibs 22 on the upper end  
32 of the chamber 23 and pulling upwards. Removal of the  
33 device 24, also removes dip tube 31 from the container  
34 1.

35

36 Fig. 9 shows a third example of a device 54 for

1 releasing a fluid 58 into a liquid in a container 1.  
2 The device 54 comprises a housing 57 which has spurs  
3 33, 34 which hold a head 35 of a fluid chamber 36. The  
4 chamber 36 has a sealing gasket 37 which defines an  
5 opening 38 which is closed by a foil membrane and  
6 plastic seal 39. The opposite end of the chamber 36  
7 has a hole which is covered by a membrane 40. The  
8 lower portion of the housing 57 has a rupture portion  
9 41 with a fluid passageway 42 therein. Depending from  
10 the rupture portion 41 is a connector 43 to which a dip  
11 tube 44 is attached. Hence, the fluid passageway 42  
12 communicates with the interior of the dip tube 44.  
13

14 The upper section of the housing 32 has a telescopic  
15 section 45 in which is located a plunger 46. Bleed  
16 holes 47 in the housing 57 and the telescopic section  
17 45 permit gas to bleed into void 48 between the plunger  
18 46 and the upper end of the fluid chamber 36 from air  
19 space 49 in the container 1. In addition, an optional  
20 spring 50 may be located between the upper end of the  
21 chamber 36 and the inside of the plunger 46 (see Fig.  
22 10). The spring 50 is optional and is preferably used  
23 where the liquid in the container 1 is a still liquid.  
24 However, the spring 50 may also be used where the  
25 liquid is aerated or naturally produces a gas.  
26

27 In use, the device 54 is located in the container 1 in  
28 the neck 3 and is secured in position by a threaded cap  
29 51 which also seals the container 1. The cap 51  
30 threadedly attaches to the opening 3, as shown in Fig.  
31 9. The position of the device shown in Fig. 9 is the  
32 position in which the container 1 would be retailed or  
33 stored.  
34

35 When a user wishes to use a liquid within a container  
36 1, the threaded cap 51 is removed and either pressure

1 of the spring 50 and/or the pressure of gas in the void  
2 48, which has entered the void 48 through the bleed  
3 holes 47, forces the telescopic section 45 upwards to  
4 the position shown in Fig. 10.

5  
6 When the device 54 reaches the position shown in Fig.  
7 10, a user may press the plunger 46 downwards in the  
8 direction of the arrow 52. This causes the telescopic  
9 section 45 to move downwards, forcing the chamber 36  
10 downwards by spurs 53 which are engaged against the  
11 upper end of the chamber 36. As the chamber 36 is  
12 forced downwards within the housing 54, the rupture  
13 portion 41 ruptures the foil membrane 39 which releases  
14 fluid 58 through the fluid outlet 42 into the dip tube  
15 44. The fluid 58 is either pressurised on insertion of  
16 the fluid 58 into the chamber 36, or else gas from the  
17 void 49 in the container 1 has pressurised the fluid 32  
18 by entering the chamber 36 through bleed holes 37, void  
19 48 and the semi-permeable membrane 40. The pressurised  
20 fluid 58 is expelled from the chamber 36 through the  
21 dip tube 44 into the liquid in the container 1 by this  
22 pressure.

23  
24 After the fluid 58 has been expelled from the chamber  
25 36, the device 54 may be removed from the container 1  
26 (see Fig. 12) by a user grasping nibs 55 on the top end  
27 of the telescopic section 45.

28  
29 A fourth example of a device 60 for introducing a  
30 liquid 61 into liquid 2 in the container 1 is shown in  
31 Fig. 13. Device 60 is similar to the device 24, except  
32 that the device 60 has a chamber 62 which incorporates  
33 a one-way valve 63 which permits gas from air space 49  
34 in the container 1 to enter chamber 62 and pressurise  
35 the liquid 61. Apart from this modification, the  
36 chamber 62 is identical to the chamber 23 of device 24

1 shown in Figs. 5 to 8. In use, the device 60 operates  
2 in a similar manner to the device 24 and it is gas  
3 which enters chamber 62 during storage via the one-way  
4 valve 63 which expels the liquid 61 from the chamber 62  
5 through outlet 32 into the dip tube 31 to enter liquid  
6 64 in the container 1.

7

8 Fig. 14 shows a fifth example of a device 65 for  
9 releasing fluid 66 into a liquid in the container 1.  
10 The device 65 is similar to the device 54 shown in  
11 Figs. 9 to 12, except that the device 65 does not have  
12 a membrane 40 on its upper end and contains no holes in  
13 its upper end. In the device 65, the liquid 66 is  
14 pressurised when it is inserted into chamber 67 and  
15 before the chamber 67 is sealed.

16

17 However, the device 65 operates in a similar manner to  
18 the device 54 and could use an optional spring 50  
19 located between the upper end of the chamber 67 and the  
20 inside of the plunger 46.

21

22 A sixth example of the device 68 for releasing fluid 69  
23 into liquid in a container 1 is shown in Fig. 15. The  
24 device 68 is similar to the device 54 shown in Figs. 9  
25 to 12, except that chamber 70 does not have a seal  
26 gasket 39 and only has an opening 71 sealed by a foil  
27 membrane 72. In addition, housing 73 of the device 68  
28 is identical to housing 57, except that it has a  
29 slightly modified rupture portion 74 and no connector  
30 43 or dip tube 44. Hence, fluid outlet 75 permits  
31 fluid 69 to be expelled from the chamber 70 directly  
32 onto the surface of the liquid in the container 1, when  
33 chamber 70 is urged downwards so that the rupturing  
34 portion 74 ruptures the foil membrane 72. Operation of  
35 the device 68 is similar to the device 54 shown in  
36 Figs. 9 to 12 and if desired, an optional spring 50 can

1 be fitted between the top of the chamber 70 and the  
2 inside of plunger 46 to aid lifting of the telescopic  
3 section 45 and plunger 46 when the threaded cap 51 is  
4 removed from the container 1.

5

6 A seventh example of a device 80 for releasing a fluid  
7 81 into a liquid in a container (not shown) is shown in  
8 Fig. 16. The device 80 comprises a housing 82 which  
9 has an upper section 83 and a lower section 84.

10 Attached to the upper section 83 is a cap 85 which has  
11 a number of ridges 86 on its top surface. In addition,  
12 there is a vent hole 87 in the cap 85 and the hole 87  
13 is covered by a semi-permeable membrane 88. Located  
14 within the housing 82 is a fluid chamber 89 in which  
15 the liquid 81 is contained. The fluid chamber 89 has  
16 an open end 90 which is sealed by an annular gasket 91  
17 and a central aperture 92 of the gasket 91 is sealed by  
18 a foil membrane 93. A protective cap 94 covers the  
19 gasket 91 and the cap 94 has a central aperture therein  
20 which coincides with the aperture 92 in the gasket 91.  
21 The cap 94 is snapped over open end 90 of the fluid  
22 chamber 89 and the cap 94 terminates in sprung legs 95  
23 at the side of the fluid chamber 89.

24

25 The lower portion 84 of housing 82 has a central  
26 rupturing portion 96 in which grooves 97 are formed.  
27 The lower portion 84 of the housing 82 is formed by  
28 arms 98 which extend from upper portion 83 downwards  
29 and then radially inwards to join the rupturing portion  
30 96 and there are gaps between the arms 98.

31

32 In use, the device 80 may for example be filled with a  
33 liquid which is super-saturated with nitrogen. The  
34 device 80 may then be attached to the underside of the  
35 cap of a drink can, in which the ring pull of the drink  
36 can is located. The device 80 may be attached to the

1 underside of the cap of the drink can by adhesive which  
2 attaches ribs 86 to the underside of the drink can.  
3 The ridges 86 are not continuous thus permitting gas  
4 within the drink can to pass from the drink can, after  
5 it is sealed, through membrane 88 and vent hole 87 into  
6 air gap 99 between the top of the chamber 89 and the  
7 underside of the cap 85.

8

9 Typically, the drink can may be a can for beer or  
10 another drink in which the contents of the can are  
11 pressurised.

12

13 When a user opens the can by pulling the ring pull, the  
14 pressure within the can will drop to atmospheric  
15 pressure. However, the membrane 88 prevents immediate  
16 equalisation of the pressure between the air gap 99 and  
17 the rest of the can and therefore prevents the pressure  
18 in the air gap 99 falling to atmospheric pressure.

19 This pressure differential acts against the upper end  
20 of the chamber 89 which forces the chamber 89 downwards  
21 and against the rupturing portion 96 which ruptures the  
22 foil membrane closure 93. The chamber 89 is then in  
23 the position shown in Fig. 17 in which the rupturing  
24 portion 96 has pierced the membrane 93. Fluid 81 in  
25 the chamber 89, which is pressurised, is then expelled  
26 through grooves 97 in the rupturing member 96 and out  
27 of the housing 82 via the gaps in the arms 98 in the  
28 lower section 84 of the housing 82, and into contact  
29 with the liquid in the can. As the excess pressure in  
30 the air gap 99 bleeds through the vent hole 87 and  
31 membrane 88, the pressure on the upper end of the  
32 chamber 89 reduces to atmospheric pressure and the  
33 chamber 89 relaxes to the position shown in Fig. 18.

34

35 When the rupturing member 96 ruptures the foil membrane  
36 93, spring arms 95 are already engaged below lugs 100

1     which prevents the pressure within the chamber 89  
2     pushing the chamber 89 back upwards to the position  
3     shown in Fig. 16.

4  
5     An advantage of the device 80 shown in Figs. 16 to 18  
6     is that the fluid 81 within the chamber 89 can be  
7     released into the contents of the liquid in the  
8     container, for example a drink can or a bottle, without  
9     requiring a user to activate the device 80.

10  
11    However, in certain instances devices 5, 24, 54, 60, 65  
12    or 68 may be more desirable as this would give a user  
13    the option of whether or not to release the fluid  
14    within the fluid chamber into contact with the liquid  
15    in the container. A user may then decide, if they  
16    wish, not to mix the fluid with the liquid if use of  
17    the fluid is optional.

18  
19    A further advantage of the invention is that the fluid  
20    chamber is only punctured or ruptured, when the fluid  
21    needs to be released into the liquid in the container.

22  
23    The use of a dip tube, such as dip tubes 31 on the  
24    devices 24 and 60 and the dip tube 44 on devices 54 and  
25    65, permit the fluid to be introduced into the body of  
26    the liquid, rather than the surface. This has the  
27    advantage that gas in the fluid may be used, for  
28    example, to froth the liquid or generate a head on the  
29    mixed liquid. An example of such a mixed liquid may be  
30    a flavoured milkshake, in which case the fluid may be a  
31    mixture of a flavour concentrate and a gas.

32  
33    A further advantage of the invention is that the  
34    devices can be used with containers which are  
35    pressurised or non-pressurised and with fluid which may  
36    be a liquid, gas or a liquid/gas mixture.

- 1 Modifications and improvements may be incorporated
- 2 without departing from the scope of the invention.

1     CLAIMS

2

3     1.    A device for releasing a fluid into a liquid in a  
4     container comprising a housing, at least a portion of  
5     which is adapted to be inserted into an opening in the  
6     container and the portion having a fluid outlet  
7     therein; a puncturing device mounted on the housing; a  
8     fluid chamber movably mounted on the housing for  
9     movement between a storage position, in which fluid is  
10    retained within the fluid chamber, and a release  
11    position, in which the fluid chamber is punctured by  
12    the puncturing device and fluid is released from the  
13    fluid chamber to exit from the device through the fluid  
14    outlet.

15

16    2.    A device according to claim 1, wherein the housing  
17    includes a conduit into which the fluid passes after  
18    passing through the fluid outlet.

19

20    3.    A device according to claim 1 or claim 2, wherein  
21    the fluid in the chamber is pressurised prior to  
22    puncturing of the chamber.

23

24    4.    A device according to any of the preceding claims,  
25    wherein the fluid container contains a liquid and/or a  
26    gas.

27

28    5.    A device according to any of the preceding claims,  
29    wherein the fluid chamber includes a rupturable member  
30    which is punctured by the puncturing device to release  
31    the fluid from the fluid chamber.

32

33    6.    A device according to claim 5, wherein the  
34    rupturable member comprises a membrane.

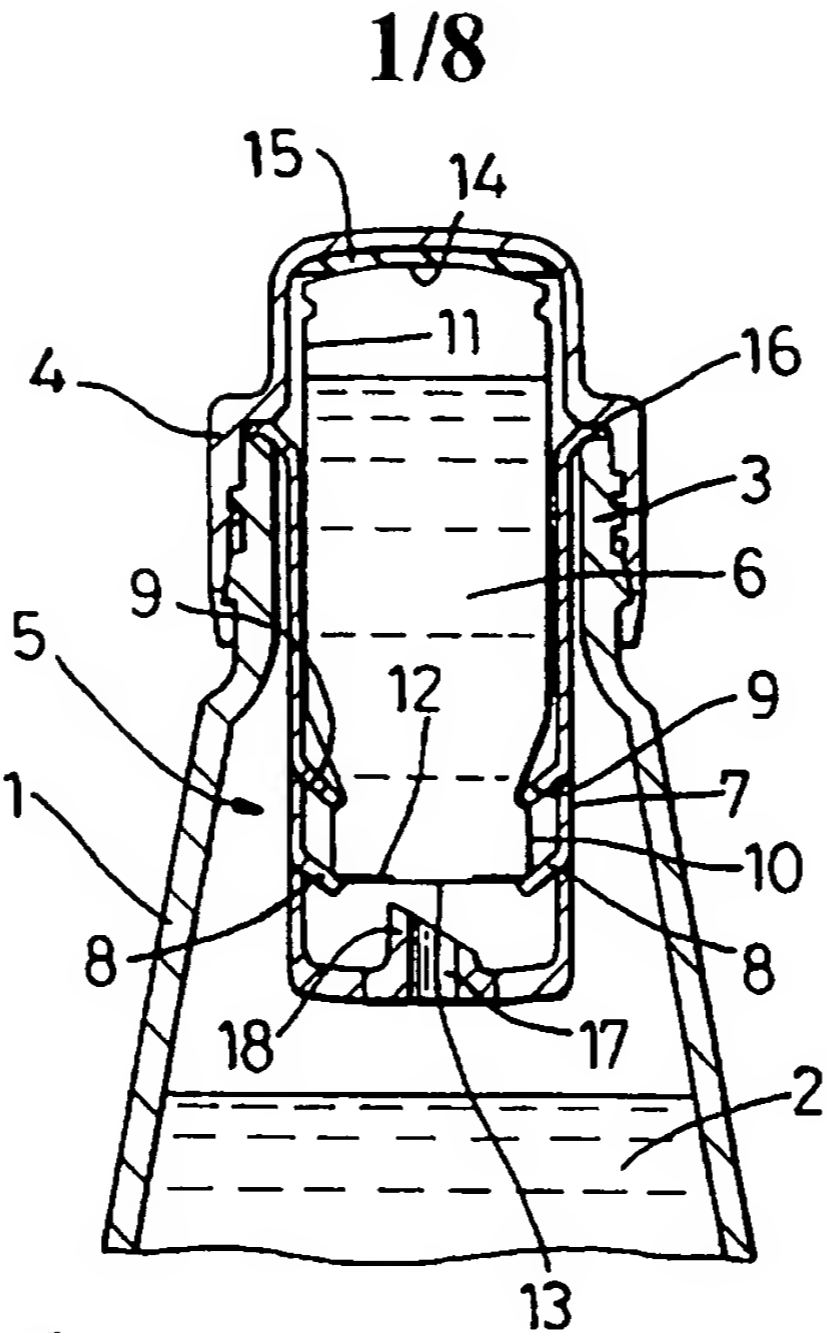
35

36    7.    A container of a liquid comprises an opening

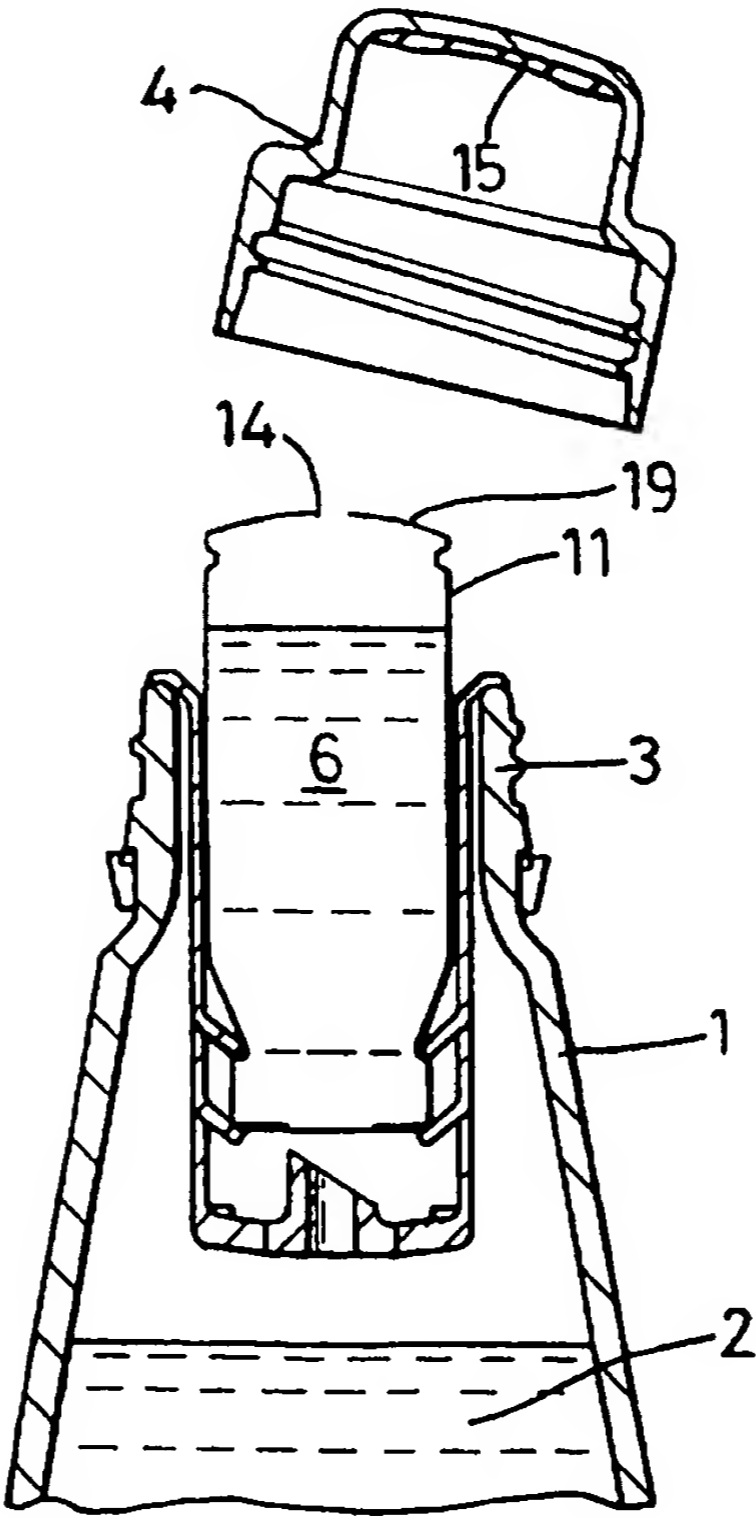
1 closed by a releasable closure and a device according  
2 to any of the preceding claims, the device releasing a  
3 fluid into the liquid in the container, and the device  
4 being mounted in the container adjacent the opening.

5

6 8. A container according to claim 7 when dependant on  
7 claim 2, wherein the conduit extends below the surface  
8 of the liquid in the container.



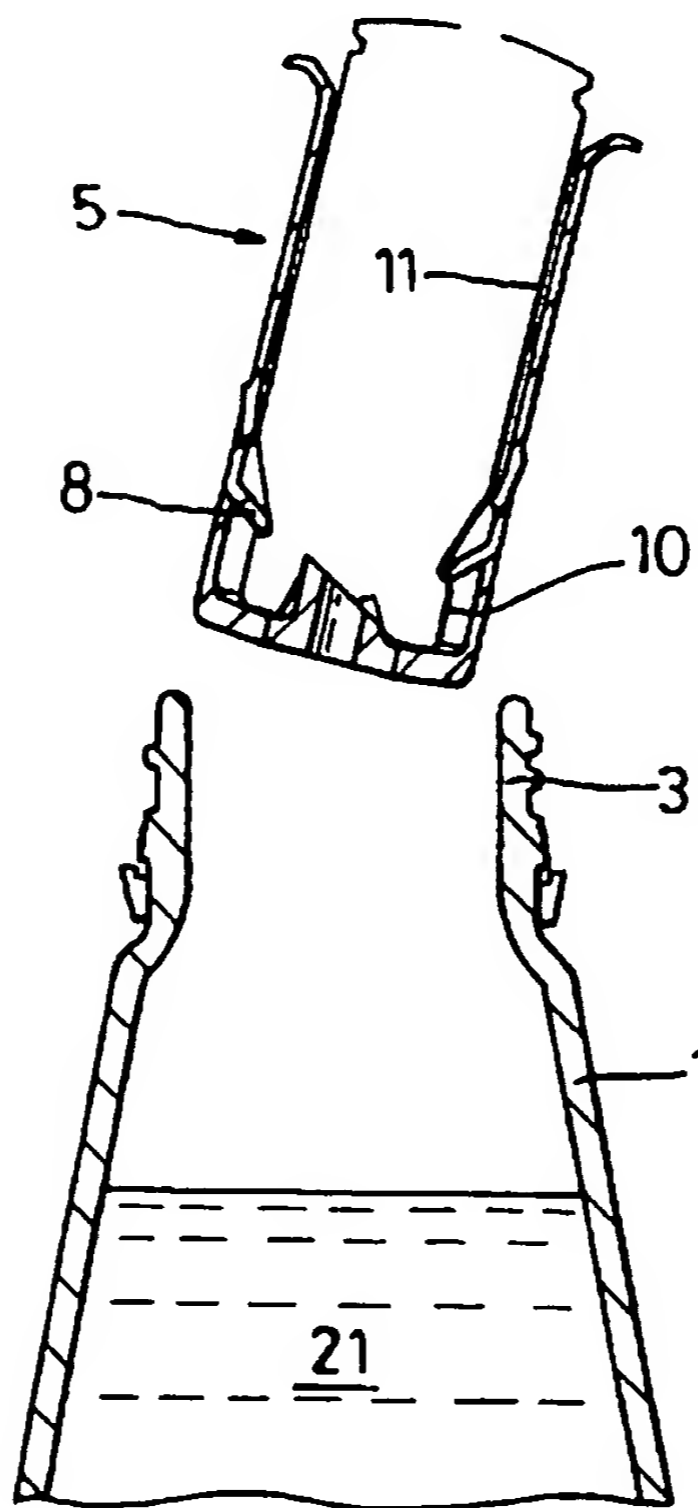
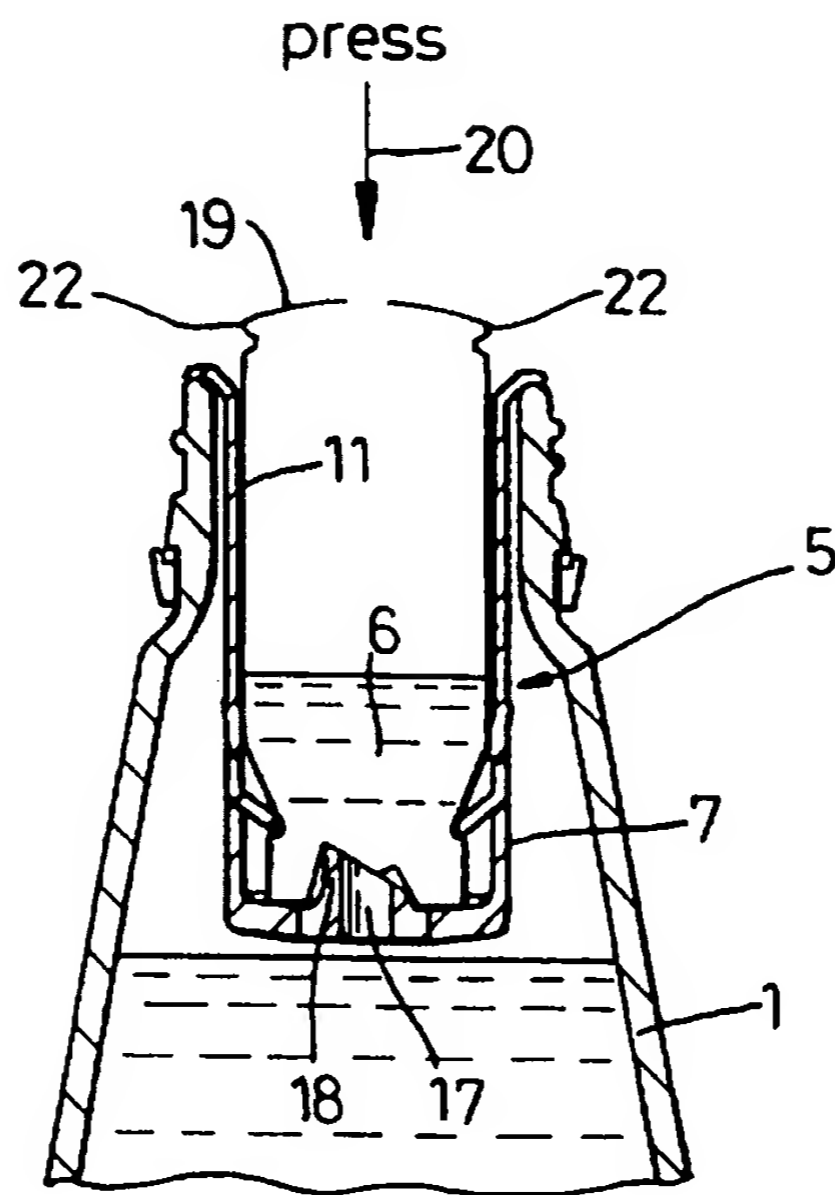
*Fig. 1*



*Fig. 2*

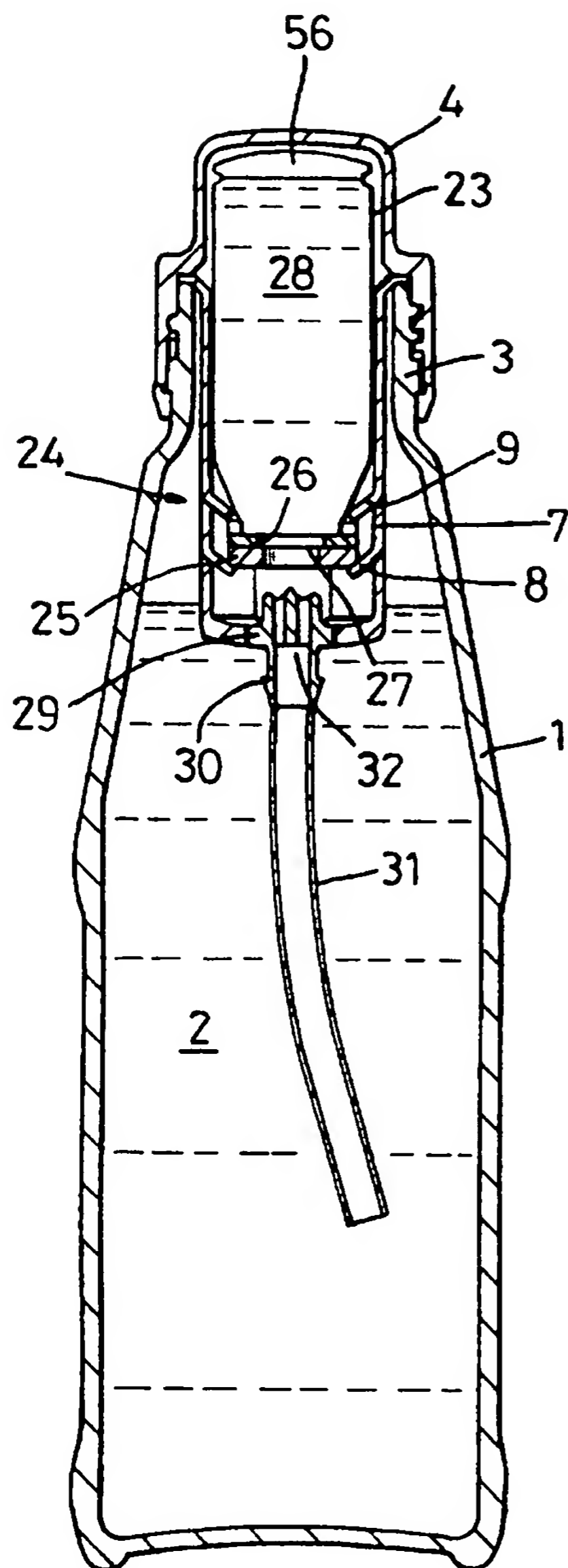
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*Fig. 3*

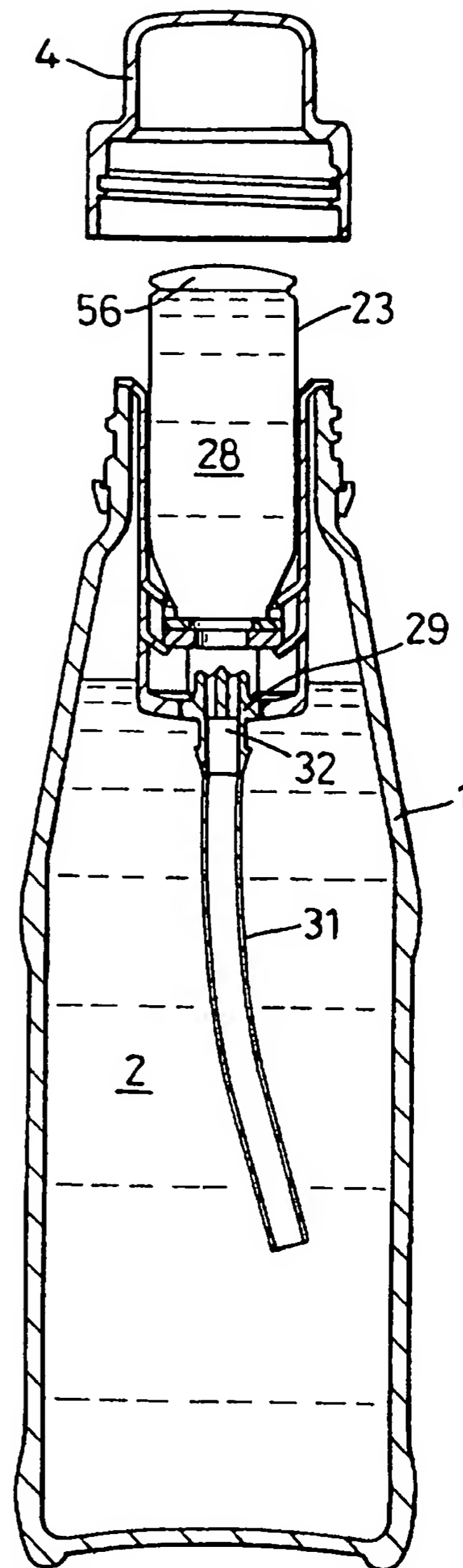


*Fig. 4*

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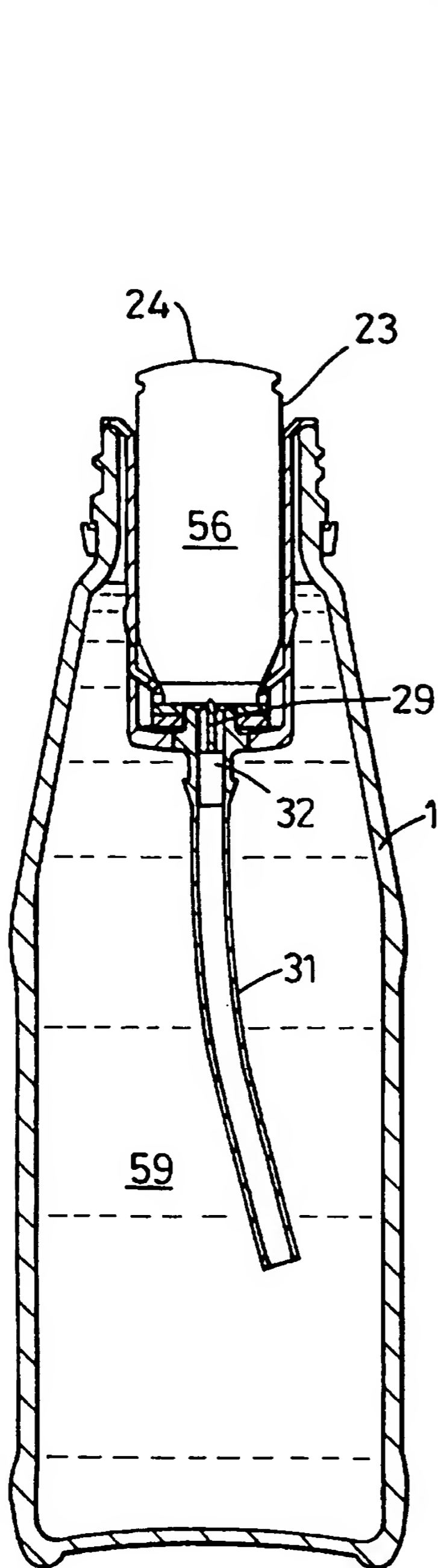


**Fig. 5**

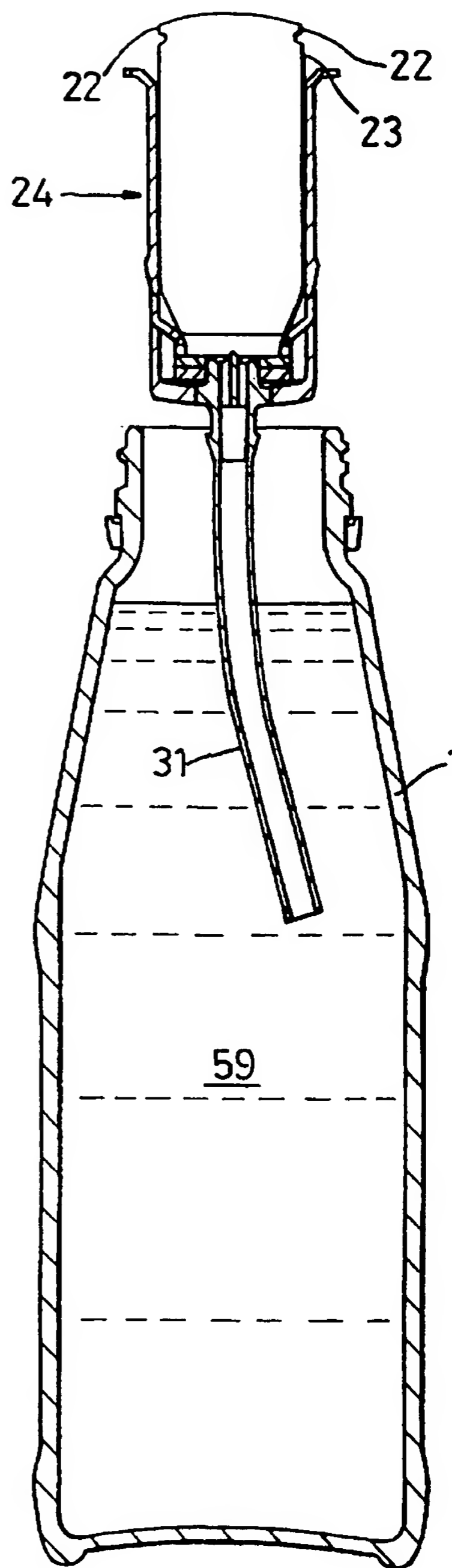


**Fig. 6**

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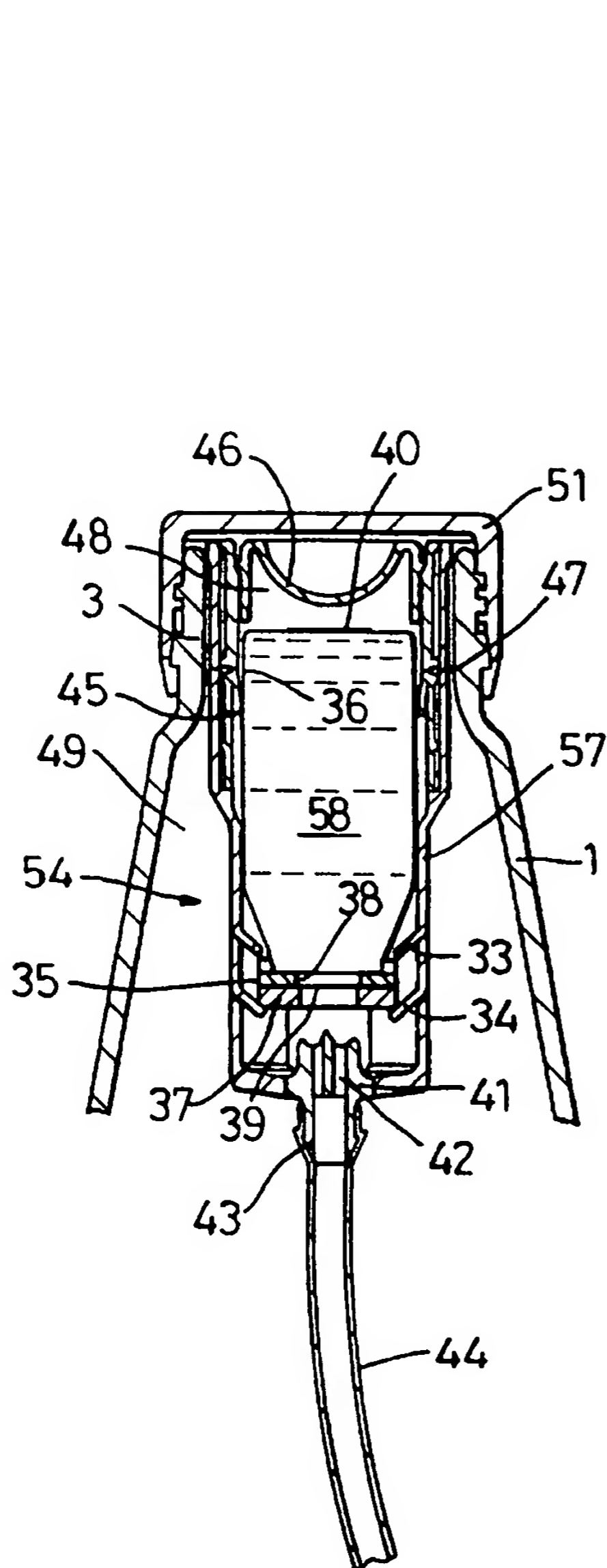


**Fig. 7**

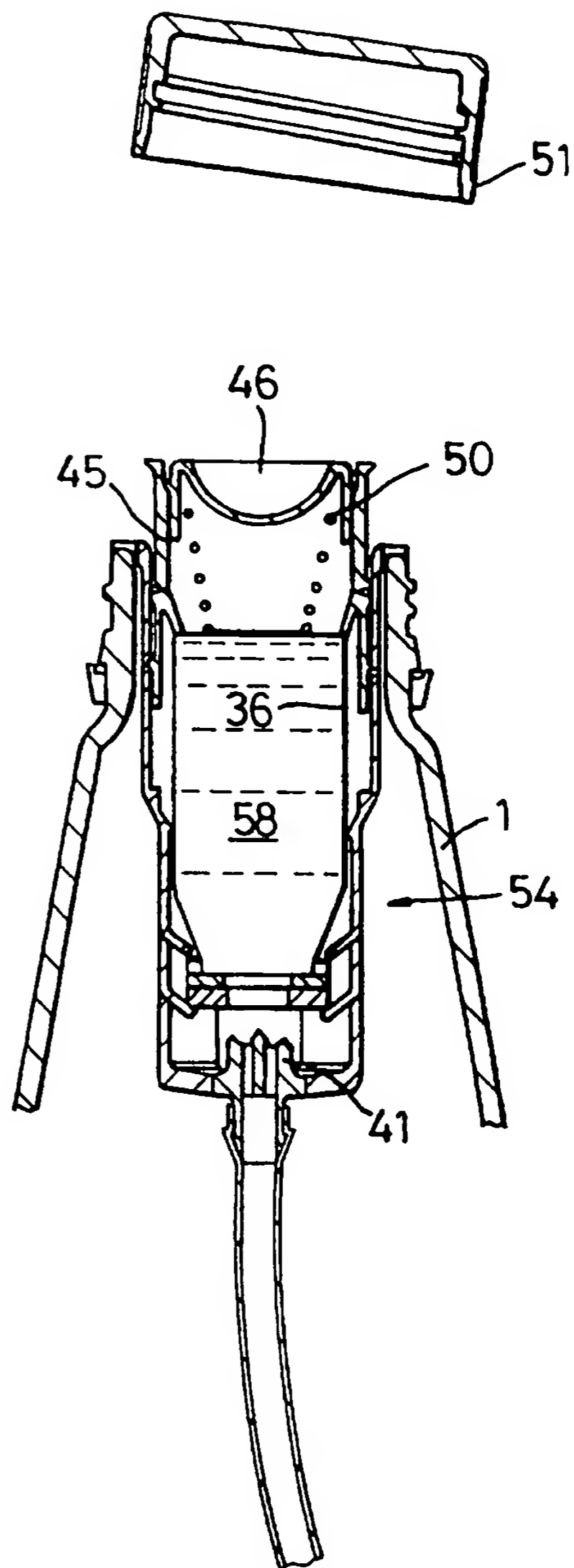


**Fig. 8**

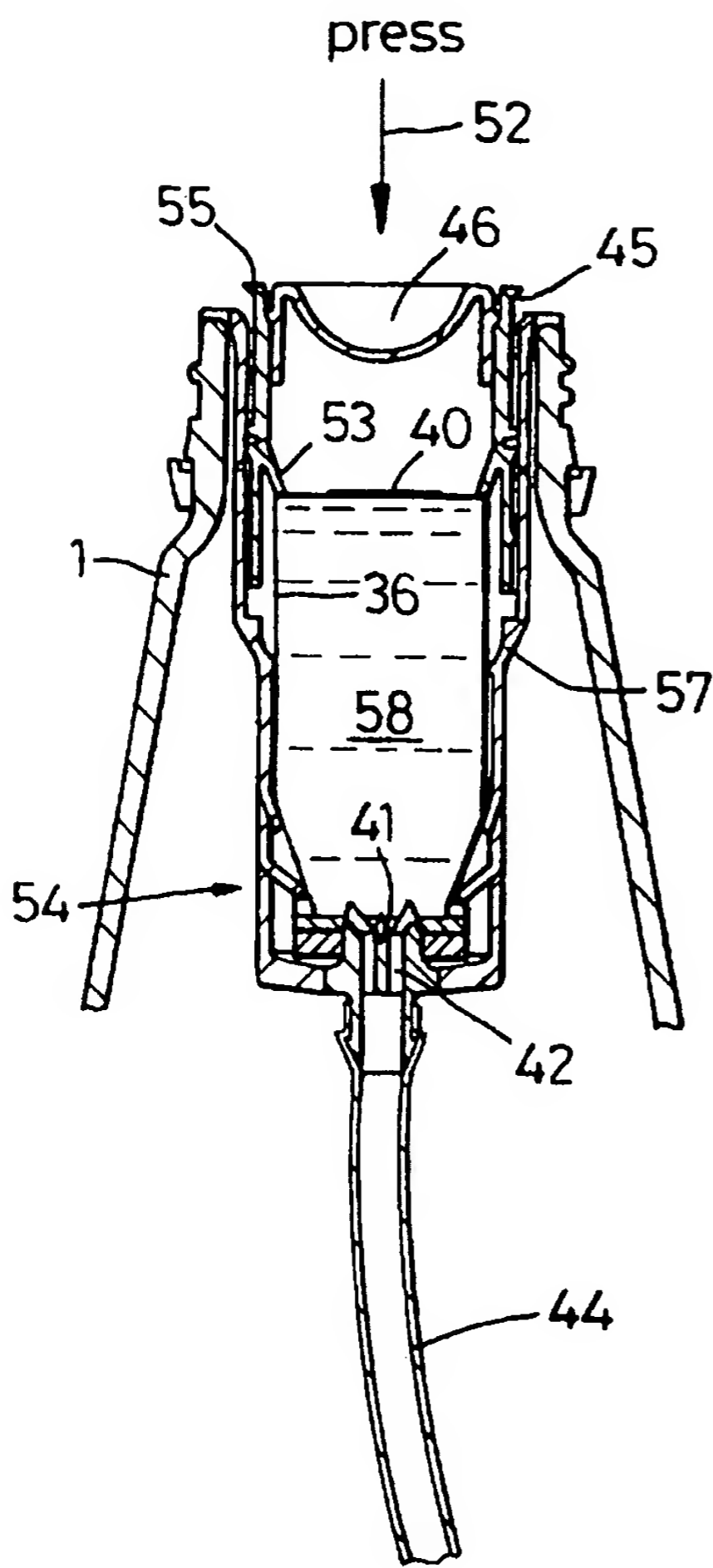
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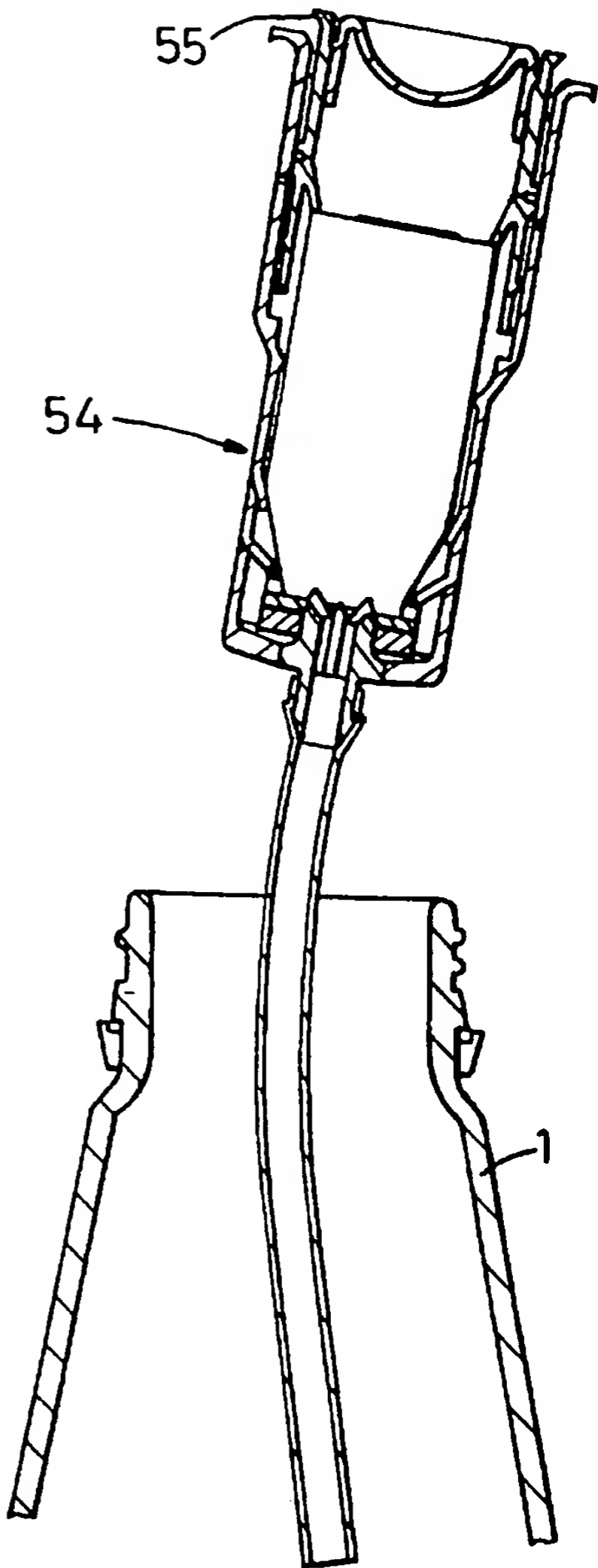
**Fig. 9**



**Fig. 10**

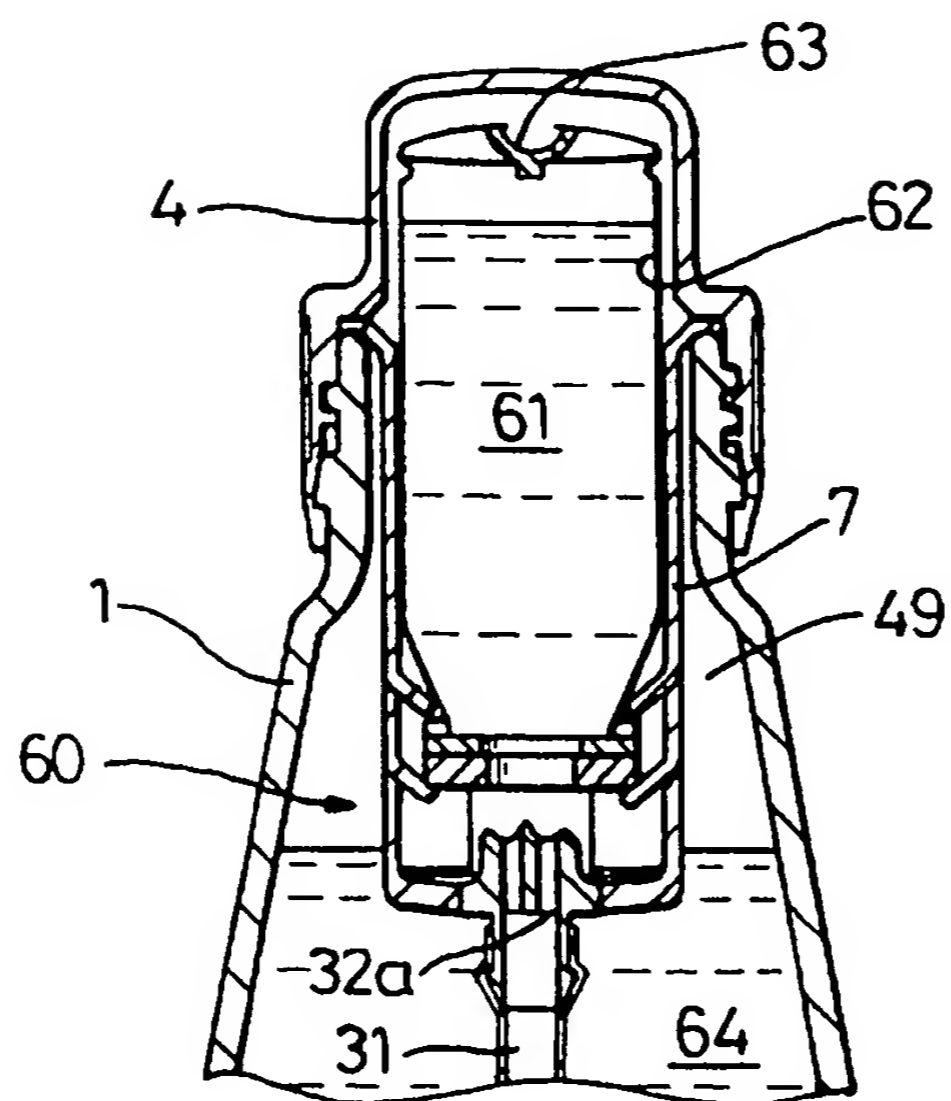


*Fig. 11*

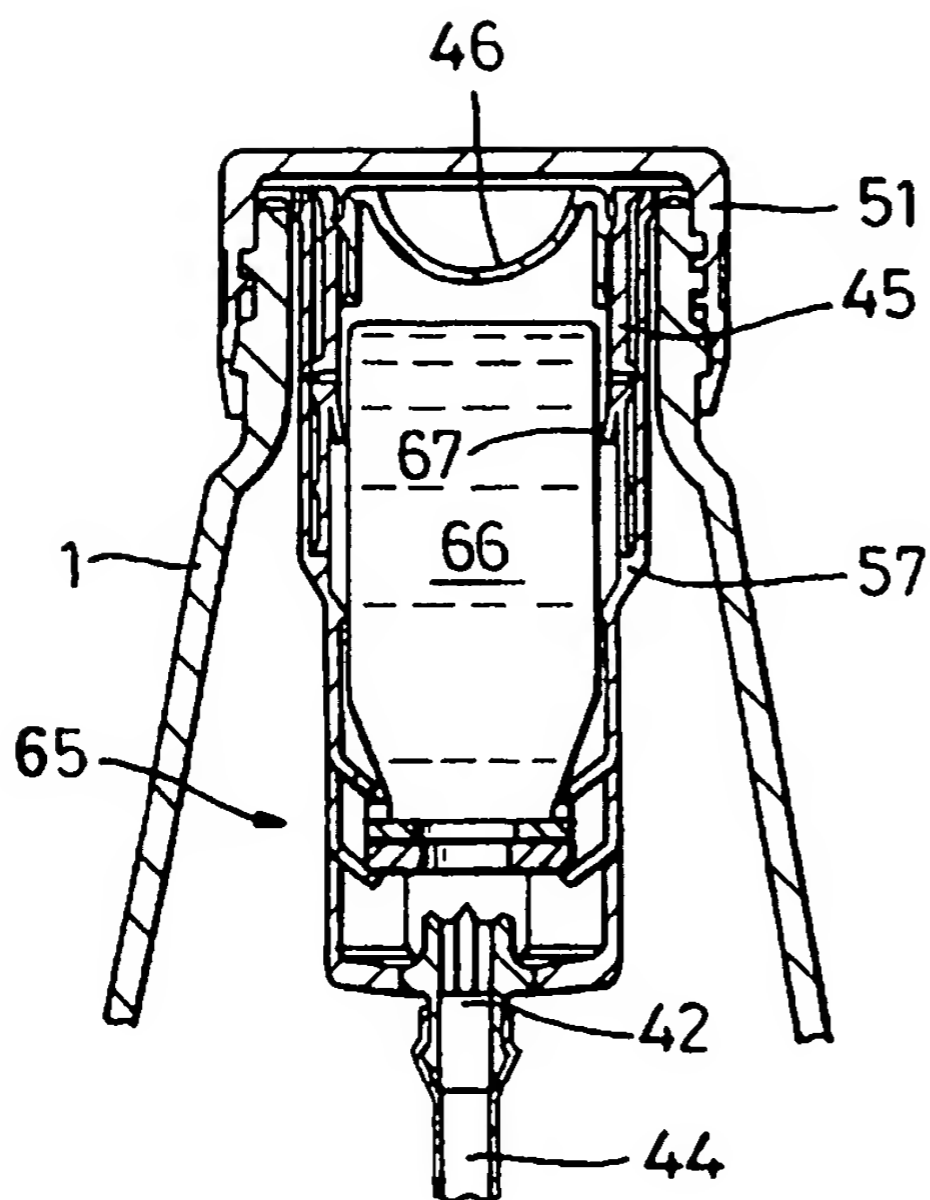


*Fig. 12*

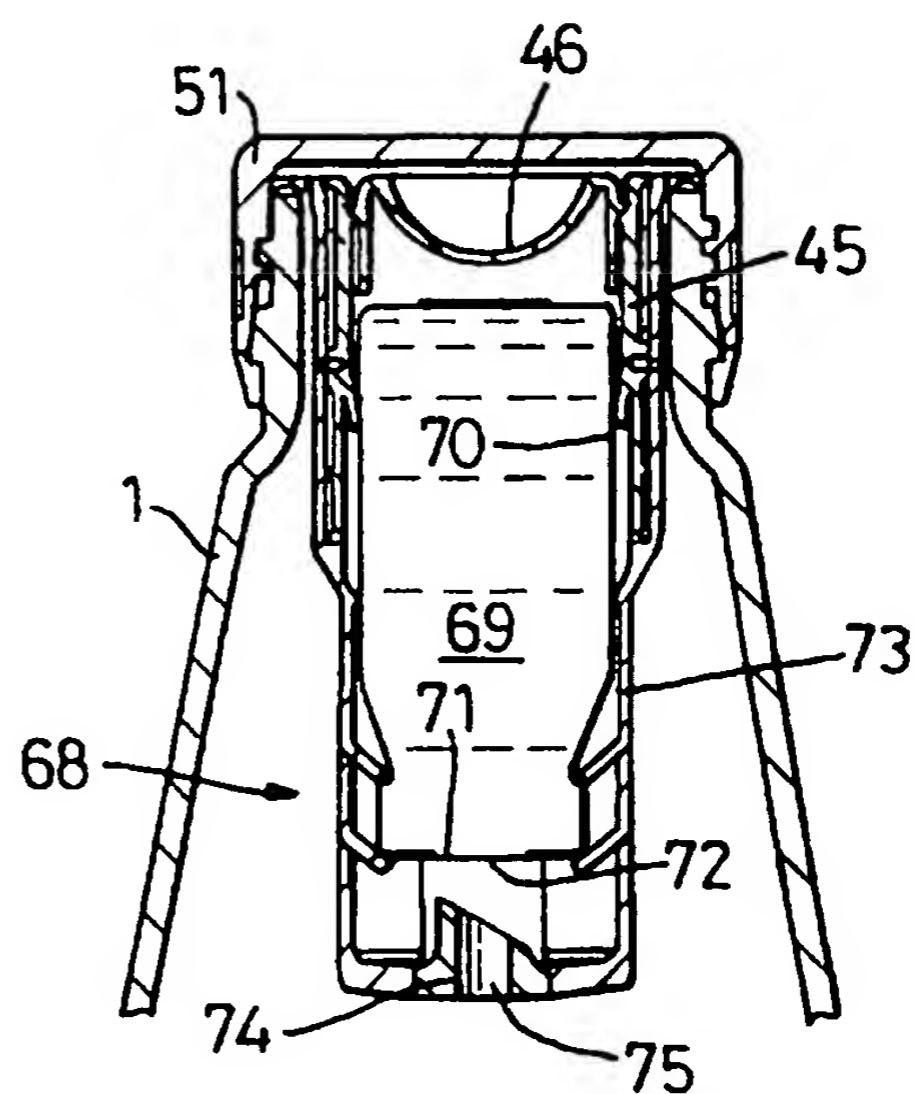
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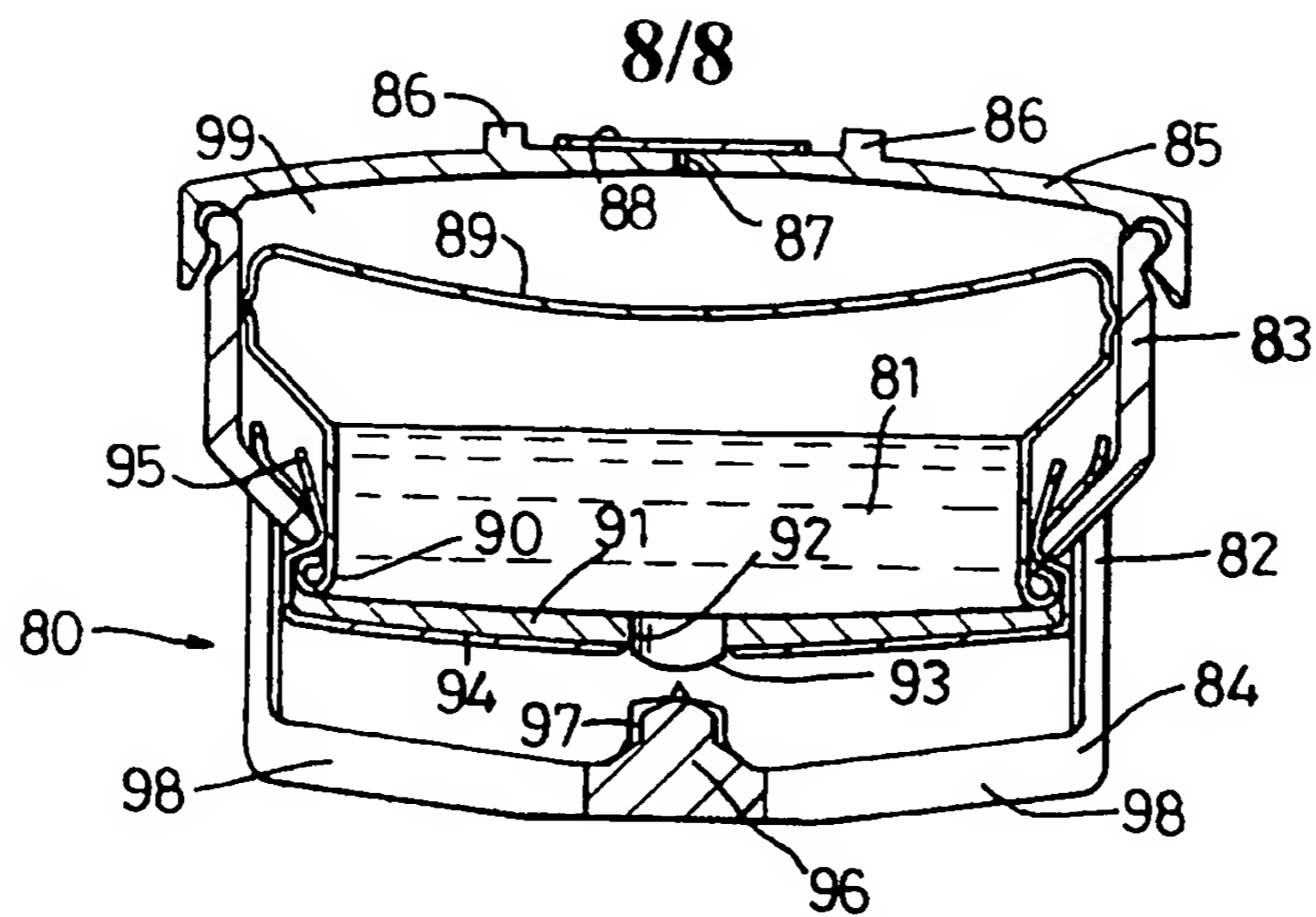
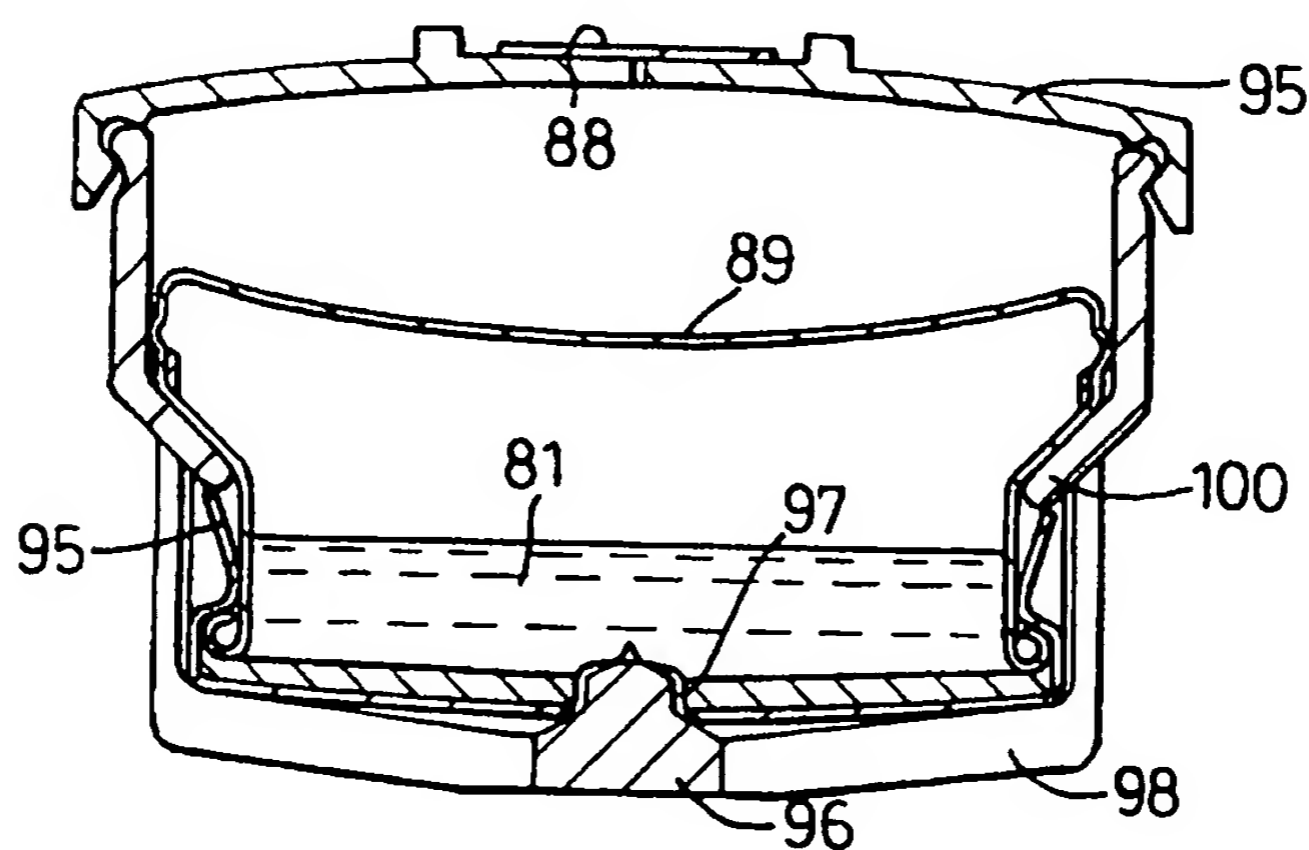
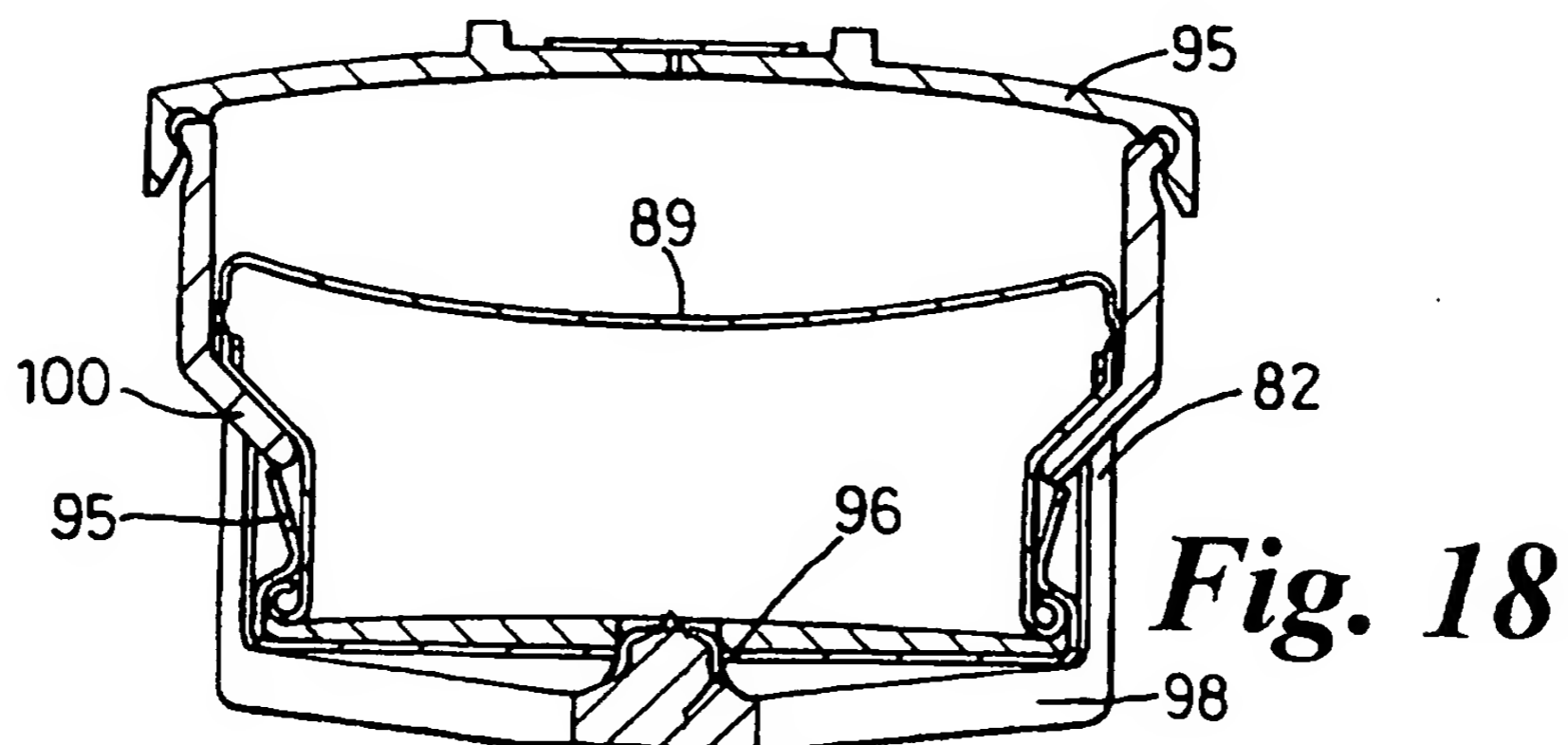
**Fig. 13**



**Fig. 14**



**Fig. 15**

**Fig. 16****Fig. 17****Fig. 18**

# INTERNATIONAL SEARCH REPORT

Interr 1 Application No  
PCT/GB 96/03092

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 B65D51/28 B65D81/32

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 201 316 A (KLINGAMAN RICHARD J) 6 May 1980 see column 4, line 26 - column 5, line 12; figures 1-4 ---	1,4-7
X	DE 24 32 290 A (WUNSCH ERICH) 22 January 1976 see page 5, last paragraph - page 6, paragraph 1 ---	1,4-7
A	US 4 821 923 A (SKORKA THOMAS) 18 April 1989 see column 4, line 26 - column 5, line 32; figures --- -/--	1-8

☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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Date of mailing of the international search report

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 95 04689 A (SMITHKLINE BEECHAM PLC ;GILES GEOFFREY ALAN (GB)) 16 February 1995 see page 8, line 12 - page 9, line 33; figures -----</p>	1-8

# INTERNATIONAL SEARCH REPORT

...information on patent family members

International Application No

PCT/GB 96/03092

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US 4821923 A	18-04-89	DE 3611690 A	15-10-87
		DE 3772807 A	17-10-91
		EP 0240817 A	14-10-87
WO 9504689 A	16-02-95	EP 0711242 A	15-05-96

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